

Smart Patient Management System

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Science and Engineering.

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APPROVAL

This project titled " **A project on developing a mobile application for Smart Patient Management System**" put together by Md. Sohorab Hossain, ID: 172-15-9582, and Abir Rahman ID: 172-15-9795 and Mt Umme Kulsum, ID: 172-15-9747 to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the Partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on *11/09/2021*

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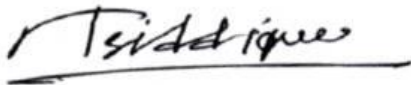
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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Shah Md. Tanvir Siddique**, Assistant Professor, Department of CSE Daffodil

International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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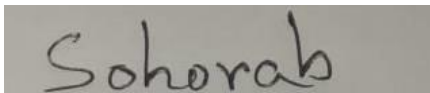
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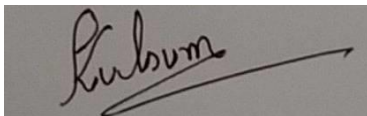
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ABSTRACT

We are living in a digitized city. And we also know that how we are dealing with our daily life with a lot's of task and by fighting with various diseases in this Mega City. When we go to doctors sometimes we faced so many problems like taking the appointment of a doctor, waiting for our serial number for hours & hours with an emergency patient .This hampers our time very much. And on the other hand our doctors also faced situations like very large number of patients are waiting out there and he/she feels suffocating for handling them. Doctors also need to listed their patient information to see their previous medication and all. So, we are making a Smart Patient Management System too simply and standardized the way of managing patients and their information. This application will be beneficial for both doctors and patient.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Now a days healthcare is getting to be more consumer-oriented all the time. Patients desires of their doctors are just like the “customers” of about each benefit supplier. So, to digitized the way of managing patients we are developing a Smart Patient Management System for especially the doctors. But this application will be beneficial for both doctors and patient. This is a android based application. Our project has been sorted out considering all important facts. In this application all the actors have separate accounts Doctors can also search the patient prescription by visiting their profile. They will also be able to get information of doctors and make appointments. In this application doctors can schedule their patient according to his visiting hours. And sometimes there is also a mismatch with the serials. This is obviously wastage of time. So what if this app will notify all the patient for the specific day. Doctors can easily find their patient by searching their names etc.

1.2 Motivation

Doctors can't serve the large number of patient according to his/her visiting hour. Some of us can't be able to come to chamber and book an appointment to the doctor. Some patients are unable to wait for the serial for a long time. Emergency patient's also have to wait all day long sometimes. Sometimes prescriptions are lost or we forgot to take those documents with us. Sometimes patient forgot their appointment to their doctors. To overcome these problems, we are developing this project.

1.3 Project Initiation Planning

Our team consist of three members who are developing this project. This project is a result of our thoughts and hard work. At first, we had several ideas for our final project. From those several ideas we choose health sector for our project. We collect information of the way that a doctor handles their patient or an assistant of a doctor handle patients. Then we research with some information that which data will provide by the actors of this whole application. After consulting

with authority and our supervisor we decided to do this particular project. Then we started our project. Our supervisor had given proper instruction.

1.4 Objective of this project

The most important objectives of smart patient management system is given below:

1. Doctors add assistants
2. Doctor and patient manually or chose from the app.
2. Doctor can see patients' prescriptions by viewing their profile.
3. Doctors can schedule patients according to their visiting hours.
4. Doctors and patient can check their prescriptions by accessing their database on this app

1.5 Expected Outcomes

The expected outcomes from our project is dynamic. Those are listed below:

- I. Through this application people will get information of any Doctors registered in this application.
- II. Doctor and patient can see their patients' prescriptions and very easily by uploading their prescription.
- III. Doctors can easily manage their patient by scheduling and sending reminder to of an appointment to that patient.
- IV. This application might help to operate a large clinic and can be able to provide data about patient illness to every doctors, this removes the fear of losing prescriptions.

1.6 Report Layout

Our overall work description that we follow to achieve our goal is providing below:

Firstly we research that if there was any such Existing project related to our project work. We found some interesting projects but every project has different operations. However, the Challenges, obstacles and difficulties we have faced are described in Chapter 2. We have also provide discussion of the backgrounds in Chapter 3. We have described some of the specifications and tests of our project in Chapters 4 and 5. We have provide the discussion of the impact of this website on the environment and the country in Chapter 6. Finally describe the future plan with our conclusion in chapter 7

CHAPTER 2

BACKGROUND

2.1 Preliminaries

We need information of the way that a doctor manage the patients as well as the assistant do. This data is important because based on this data we can plot the whole application easily and professionally. And every data provided by the user of this application will be used systematically to avoid collapse.

2.2 Related Works

There are some projects that offers Patient Managements. For example, Clinic Management Systems, Doctors Pad, Appointment manager ETC.

2.3 Comparative Analysis

This is a project that will be used across the country. Every Patient can reach doctors that are registered in this application as well as the Doctors also. No need to stand in line and spend unnecessarily. Doctors can schedule appointment as well as the assistant of that doctor can also schedule the patients. Doctors and patients both can be able to check the previous medication by checking the prescription saved in their database.

2.4 Scope of the Problem

We have described our project in short but there might be some problems regarding this projects and those are-

- I. Smart devices are used to develop all the projects. The screen of this device size is a big problem. The application may not always run properly to resolve the screen size issue. We try our best to make it responsive.
- II. Here an Appointment will be must. So, in case if any of patient are in emergency but no appointment will be placed then this causes a great harassed in that situation.

III. As this is an Android application so people should get android supported smartphones to access this application

2.5 Challenges

This project digitized the way of managing patient and taking appointment of a doctor. So there will be information of doctors from all over the country. And collecting data about how a doctor manage their patient, when a doctor starts visiting in a chamber, how long he sees a patient is much difficult to gather. Saving prescriptions to firebase collection and retrieving it to patient's profile was challenging.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

The following figure 3.1.1. shows the system modeling of Business Process and the figure 3.1.2 shows the Business Model Integration.

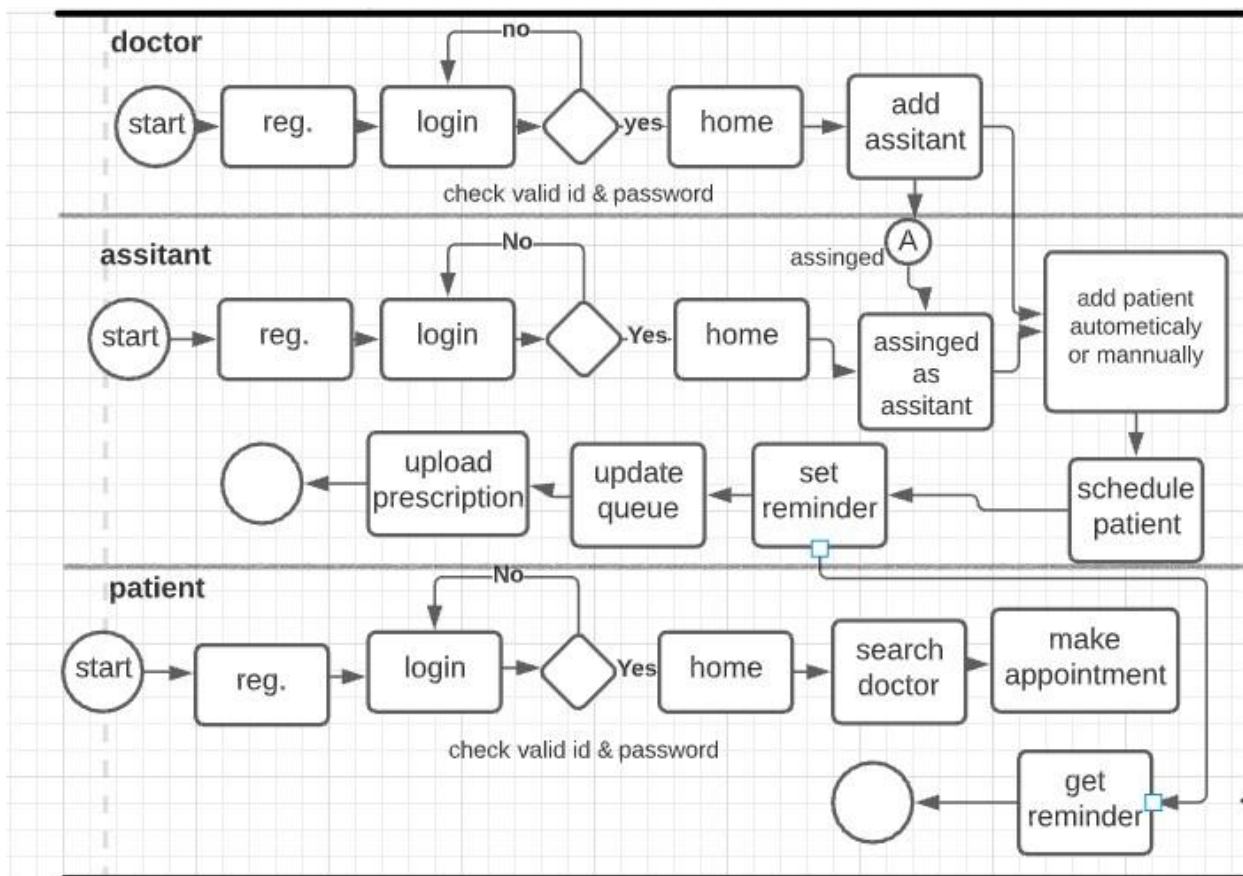


Figure 3.1: Process Modeling

3.2 Use Case Modeling and Description

In Use case Modeling we defined two types of actor. The First one is Primary Actor and the second one is Secondary Actor. In our application we have three actors performing various processes that distinguish their operation from each other. Let's know more about our Use Case Diagram.

3.3 Use Case Diagram

Figure 3.2.1: shows the Use Case Diagram of Smart Patient Management system

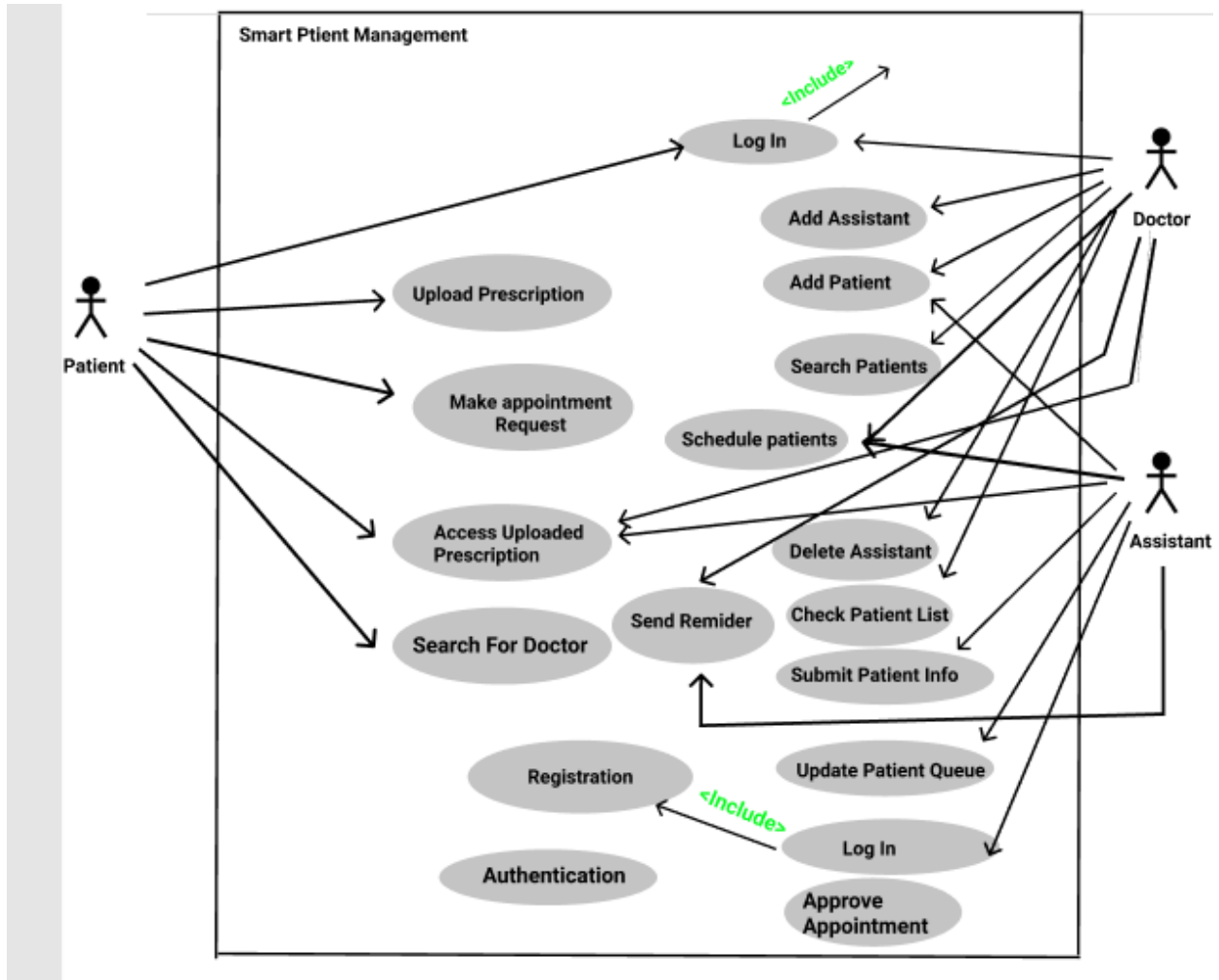


Figure 3.2: shows the Use case diagram

Actors

According to Use Case diagram of this application the actors are-

Primary actors:

- i. Doctors.
- ii. Assistants

Secondary actors:

- i. Patients

3.4 Use Case List

Doctors

Doctors can Add Assistants, Add Patients, Delete Patients, Delete Assistants, Search Patients, Access uploaded Prescriptions, Schedule patients, Send Reminders

Assistants

Add Patients, Delete Patients, Delete Assistants, Search Patients, Access uploaded Prescriptions, Update patients queue, Schedule patients, Send Reminders.

Patients

Patients can search for doctors, make Appointment request, Upload prescription

3.5 Logical Data Model

We have used firebase database as a primary database for our project. As this is a dynamic database system which provides very user friendly operations and plugins and can be accessed only through internet connection. We have used **Fire store** database collections to store all our data. Our data can be easily accessible due to being well-equipped. It is also very comfortable to work properly from the server-side. A logical data model describes the data. Below is an image of the logical data model of Smart Patient Management Project-

+ Start collection	+ Add document	+ Start collection
Assistants >	VKnBXFyd0nNEdg0KeIYAshCsyRC3	+ Add field
Doctor_Asistants	YExSkM2AjhQA40Yy9CnX0y4x1px1	About: "I have an experience of 5 years"
Doctors	v1L0U9fQefXauiGyUxKIc5pLZM2	Age: "34"
Patients		Assistant Address: "Sadarghat"
Prescriptions		Assistant Name: "saiful"
Under_doctor_patients		Assistant_Full_Name: "Saiful islam"
Username		Assistant_uid: "VKnBXFyd0nNEdg0KeIYAshCsyRC3"
storage		Created_at: April 22, 2021 at 9:34:31 PM UTC+6
users		Email: "sf@gmail.com"
		Experience: "5"
		Gender: "Male"
		Mobile: "012365862"
		Role: "Assistant"

Figure 3.3: Shows the data field for Assistants

+ Start collection	+ Add document	+ Start collection
patients >	4WM0mwn7nr3aEZTdtjFz >	+ Add field
+ Add field		Address: "Naryanganj"
		Age: "22"
		Created_at: April 22, 2021 at 11:36:04 PM UTC+6
		Doctor_uniqueid: "VKnBXFyd0nNEdg0KeIYAshCsyRC3"
		Gender: "Female"
		Patient_Name: "Hasna"
		Patient_id: 5
		Phone: "018686473550"
		searchindex
		0 ""
		1 "h"
		2 "ha"

This document does not exist, it will not appear in queries or snapshots

Figure 3.4: Shows the data field for Assistants

+ Start collection	+ Add document	+ Start collection
Assistants	8XGr05MvSBOYIoCI6Cr2egbmNOZ2	+ Add field About: "I am a heart Specialist.And Have and experience of about 5 years of doctor experience." Age: "30" ChamberAddress: "Dhaka" ChamberName: "Popular" Chamber_Closing_Time: "4:30 PM" Chamber_Opening_Time: "4:30 PM" Created_at: April 5, 2021 at 5:31:01 PM UTC+6 Doctor Speciality: "Heart Specialist" Doctor_Full_Name: "Lipa Rahaman" Doctor_id: 6 Doctor_unique_id: "8XGr05MvSBOYIoCI6Cr2egbmNOZ2" Doctorname: "Lipa"
Doctor_Asistants	0owEWxfTNogM6G3pCdtZxS0Z0hU2	
Doctors >	XjuqomP53xZ6uv3Hz7hrvnqMFcL2	
Patients	dKPubP3xPZS12qEVRz0QSIk6dhy2	
Prescriptions	1pzRW0PvEa0gyi6oLS0c7k1FrkU2	
Under_doctor_patients	1xaeEfq8PZUXJysQdtW0jFhGWw2	
Username	pléhRjNz70Y0TE8DcBwfFBuTgdr2	
storage	tEqagVq4ykQuasZEwWpWbrihLP43	
users		

3.5: Shows the data field for Doctors

+ Start collection	+ Add document	+ Start collection
Assistants	0KVnrz77eKdNmG2eDu0U >	+ Add field Patient_phone: "012659872" created_at: April 19, 2021 at 12:37:48 AM UTC+6 location: "images/image1618771061177.jpg" url: "https://firebasestorage.googleapis.com/v0/b/smart-patient-mangement-system.appspot.com/o/images%2Fimage1618771061177.jpg?alt=media&token=747d2d12-d5f8-45f9-8b79-0c420b14f9cb"
Doctor_Asistants	4djqa18SgooJZn43W7WB	
Doctors	CyL2pEaJ0YzKDNgm2XoZ	
Patients	YBzfBLSj9egxfx00E53u	
Prescriptions >	fqU699nNDKEorw8xSuGv	
Under_doctor_patients	jUCdRWEgVJbLzCjwA12H	
Username	mYYdx9kgT3xNFxG13q01	
storage	nz1DHJ9n1Vs5Kg0aiyA6	
users	sH0t9icYPkt1xjSUPG1u	
	sK02kNZrVs1285ovJ2JH	

Figure 3.6: Shows the data field for Prescription's picture URL

3.6 Design Requirement

System design means all the designs we have done or will do to Accomplish our application. This part distinguishes that how we will have all the data, which work will be done after which work etc. And this means that the purpose of Design requirement part is the architecture of our system. And that's why we had to design different diagrams i.e. as BPM, Use case diagram etc. And also, the other interfaces of our project. We have used the latest technology for our various designs and models. And we have tried to keep our UI's user-friendly.

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-end Design

There is two parts that distinguish an Android Application. And those are

- i. The front end
- ii. The back end.

The front end is the visual part of the application. Which is distinguish the User interfaces and all. This part is used for user interaction to the server.

4.2 IDE and Tools

Android Studio :

Android studio is an integrated development environment and we named it IDE for Android applications. Android Studio provides code editing, debugging and testing tools all within it. It is very user friendly and full of interesting features and easy to use. Drag and drop option is available for user interface design.

AVD Manager:

AVD manager is another useful feature of Android studio, the short form for Android Virtual Device. AVD is an emulator which is used to run android application on computer. This allows developers to work with all types of android devices to test performance on different screen size, versions and resolutions.

4.3 Back-end Design

In this project we work with android. For the Back-end design we are using flutter frame work which is quite a demanding frame work now a days. It supports a language called dart, It's a cross-platform framework which means that we can use our code whether in web applications, Android application or IOS applications.

4.4 Interaction Design and User Experience (UX)

We hope that all users will happily accept our project. We provide very user-friendly UI's an attractive design that user would love to use our application. We all faces problems or get bored by filling prescription fields and for this reason we have provide a feature that will help the user to click a picture of the prescription and then easily upload it through one tap. This is why all doctors and patients don't need to waste their time filling up the prescription fields. Our project has not been published yet. Our project is designed in such a way that it can be accessible to any people of all levels. Anyone using the Internet and devices can connect to this system.

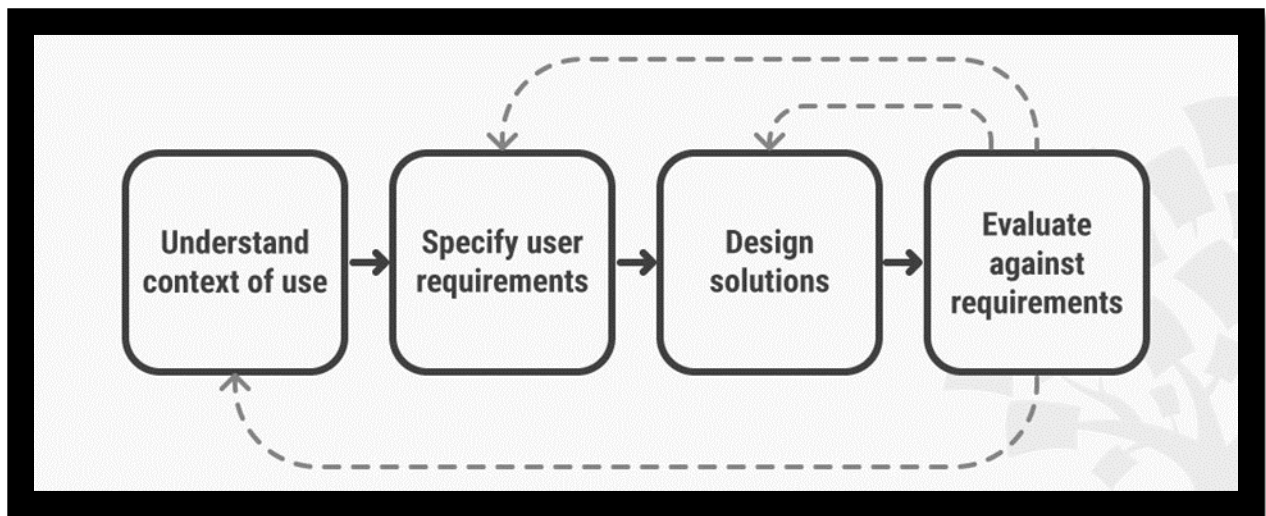


Figure 4.5: Basic Structure of User Experience

4.5 Implementation Requirements

Smart Patient Management System is an important application for doctors and patients. The actors are patients, doctors and Assistants. We already showed our Use case diagrams and use case list in Chapter 3. And this part will be a discussion about implementation Requirements. Our project is much bigger and consist a lot of transactions of data's. And it will Beneficial to both doctors and patients. For this reason, some requirements have been added to our work and

some requirements have been modified. We have implemented the project as per the list of use cases and developed function's according to the operation.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

In this project Firebase Fire-store will be used as our database. We will store data of Doctors, patient's, and assistants information in Firebase fire-store. We use different queries to retrieve or store the information to our real-time database.

5.2 Implementation of Front-end Design

We try to create attractive user interfaces for this application like doctor home page, assistant homepage, patient homepage. Login pages for all the actors etc. Those UI is presenting below:

Sign-In page: This is the first page of our application. Where all the actors will be redirected while starting the app.

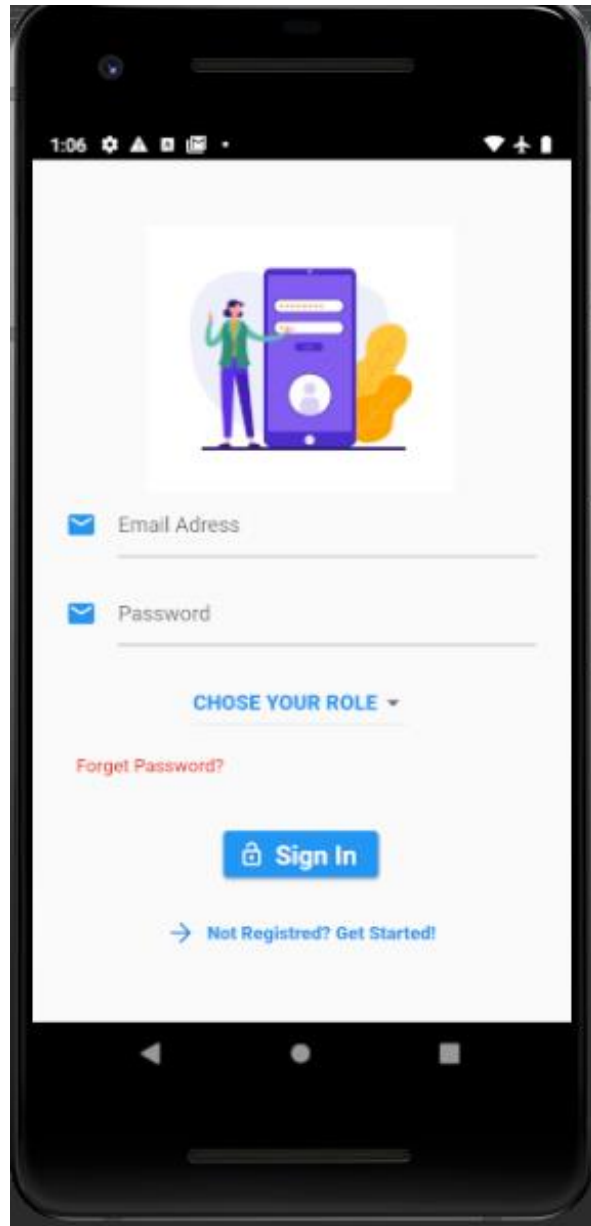


Figure 5.3 : Shows Sign-In page

Sign-Up page: If anyone don't have account he/she can registered via sign-up page. Let's see the Sign-Up pages for all the users.

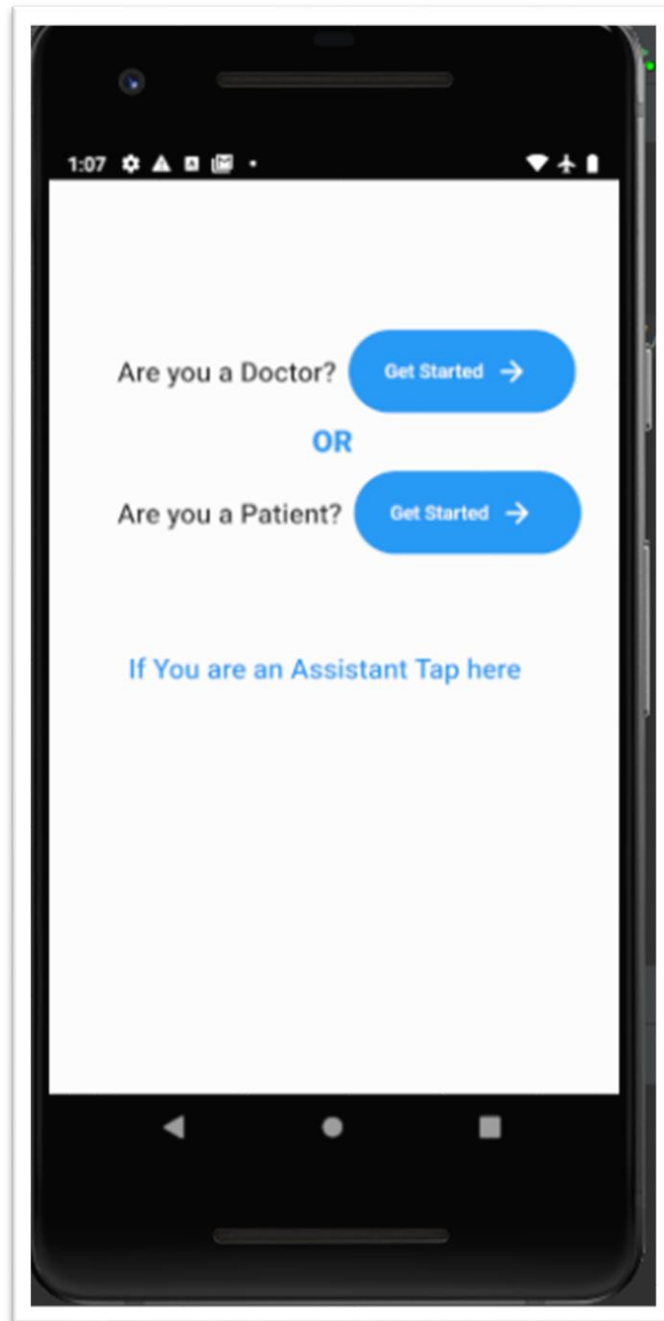


Figure 5.4: Shows Sign-up page for users

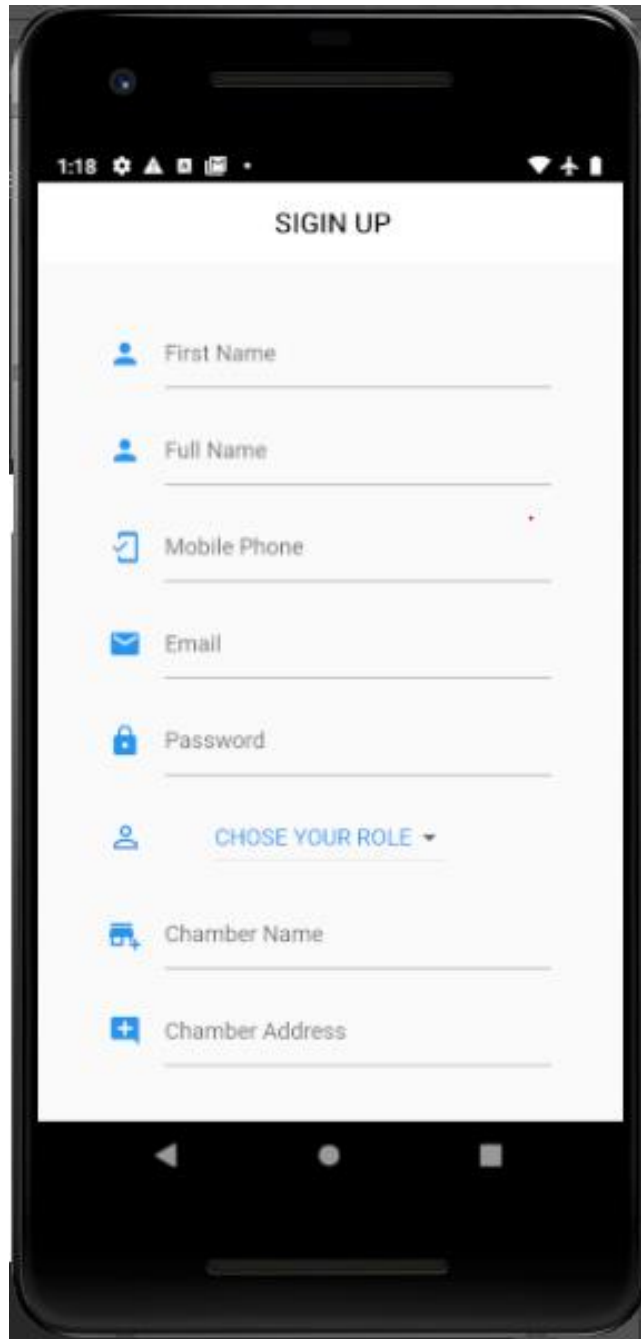


Figure 5.5: Shows Sign-up page for doctors

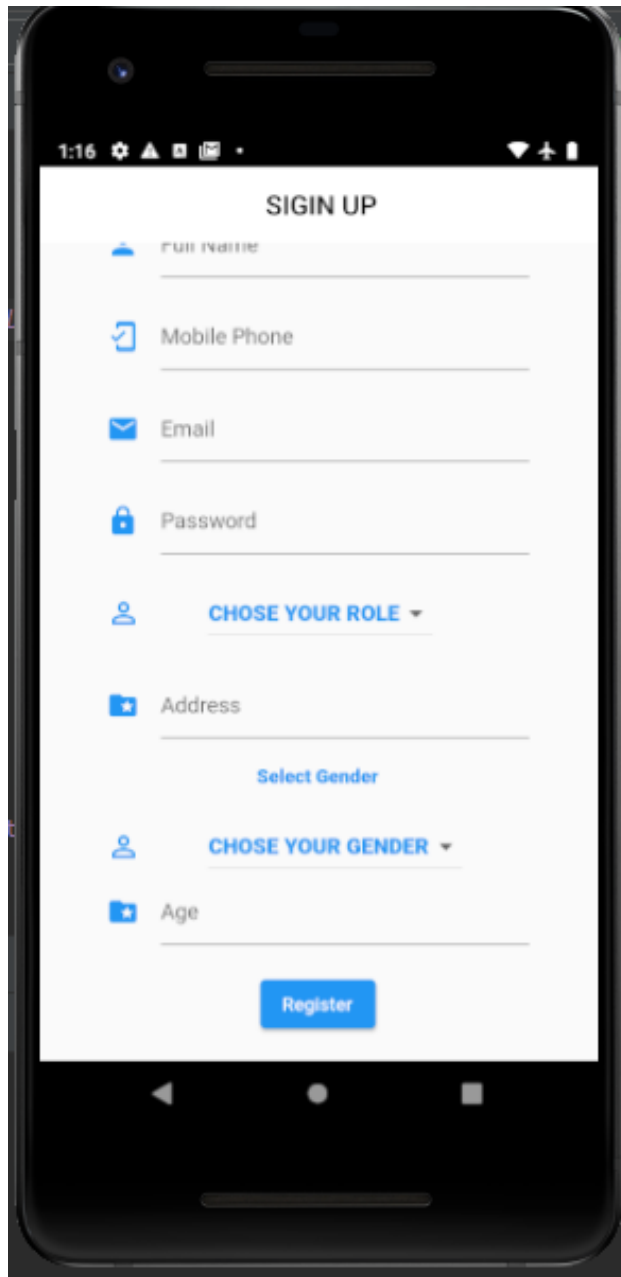


Figure 5.6: Shows Sign-Up page for Patients

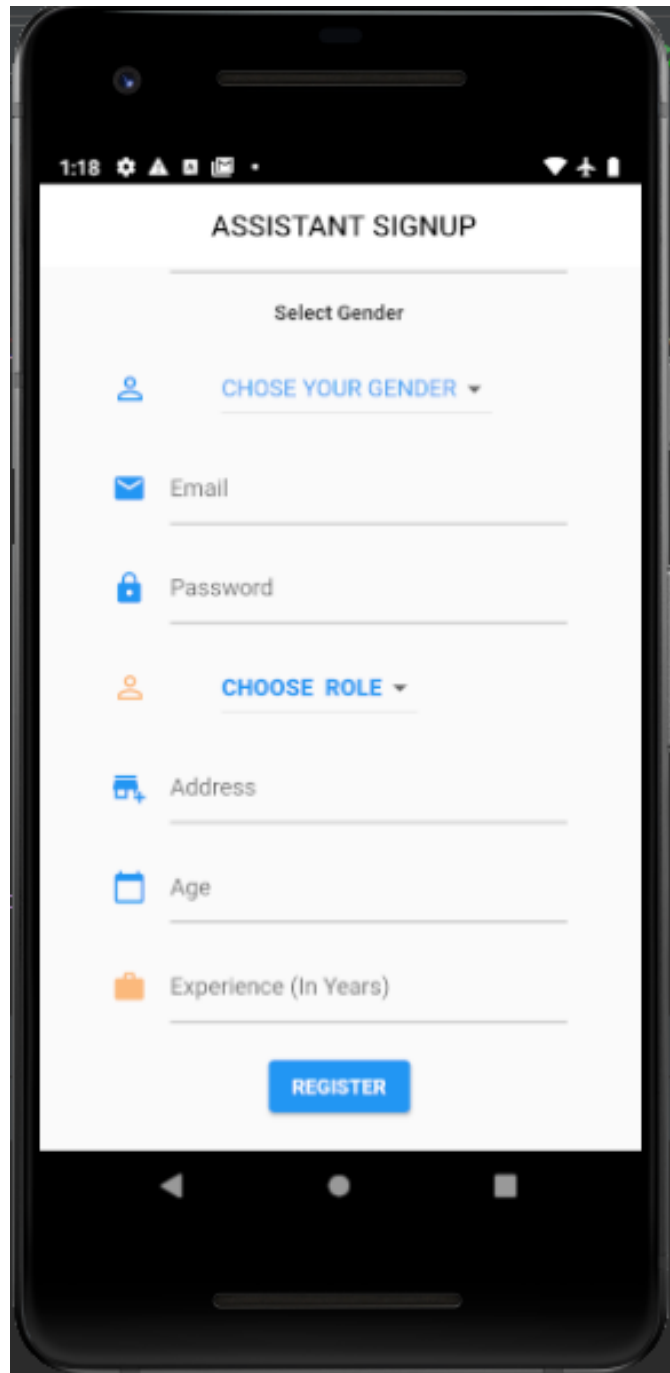


Figure 5.7 : Shows Sign-Up page for Assistant

Doctors Homepage: This section represents Doctors Homepage. Doctor can chose the desired page to redirect.

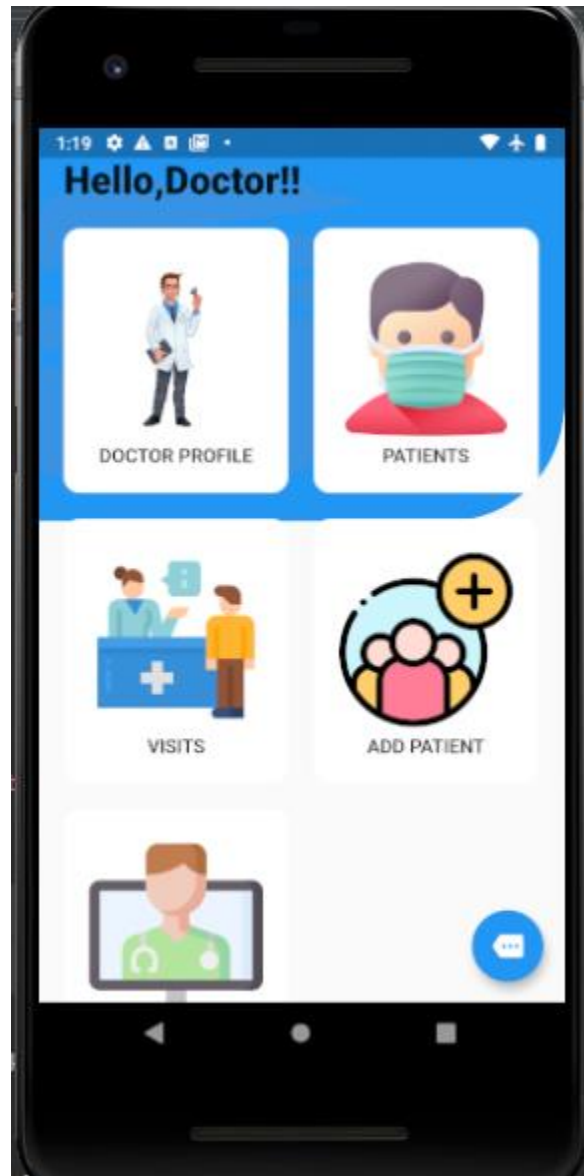


Figure 5.8: Shows Doctor Homepage

Doctor profile: By clicking doctors profile doctor can see his/her information and also can be able to edit their profile information

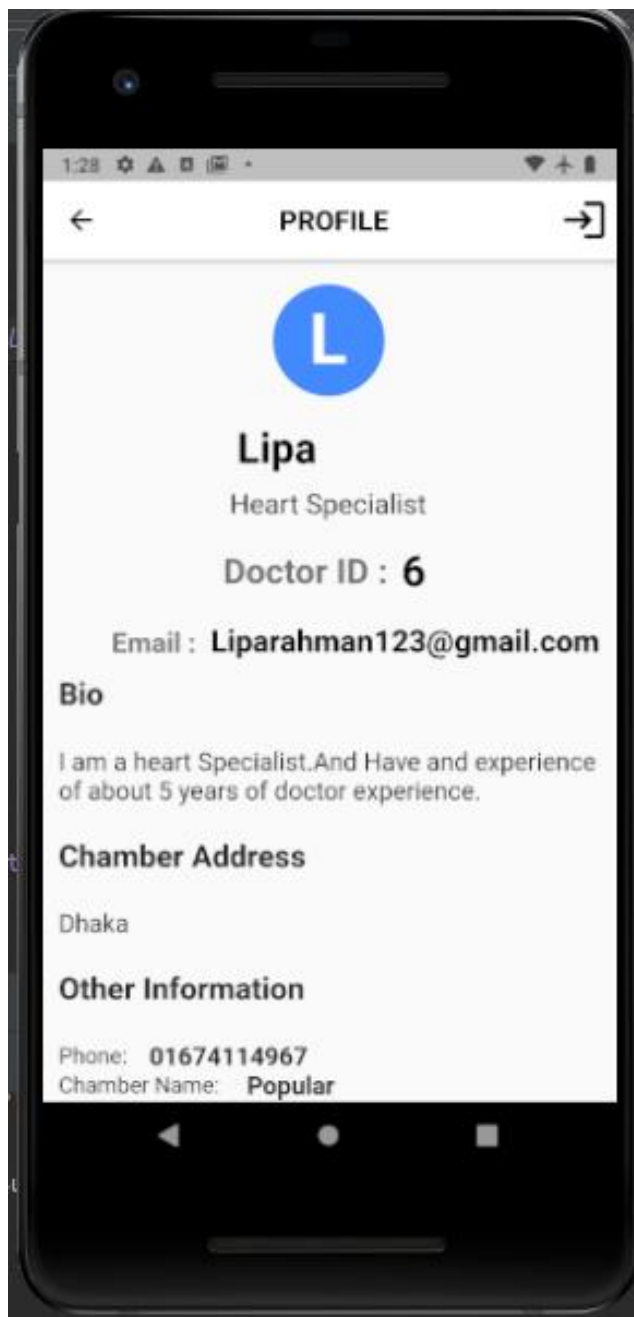


Figure 5.9: Shows Doctor Profile page

Add Patients Page: By clicking this page doctors can Add patients. Here is two options Either doctor can add patient through out the apps or add manually.

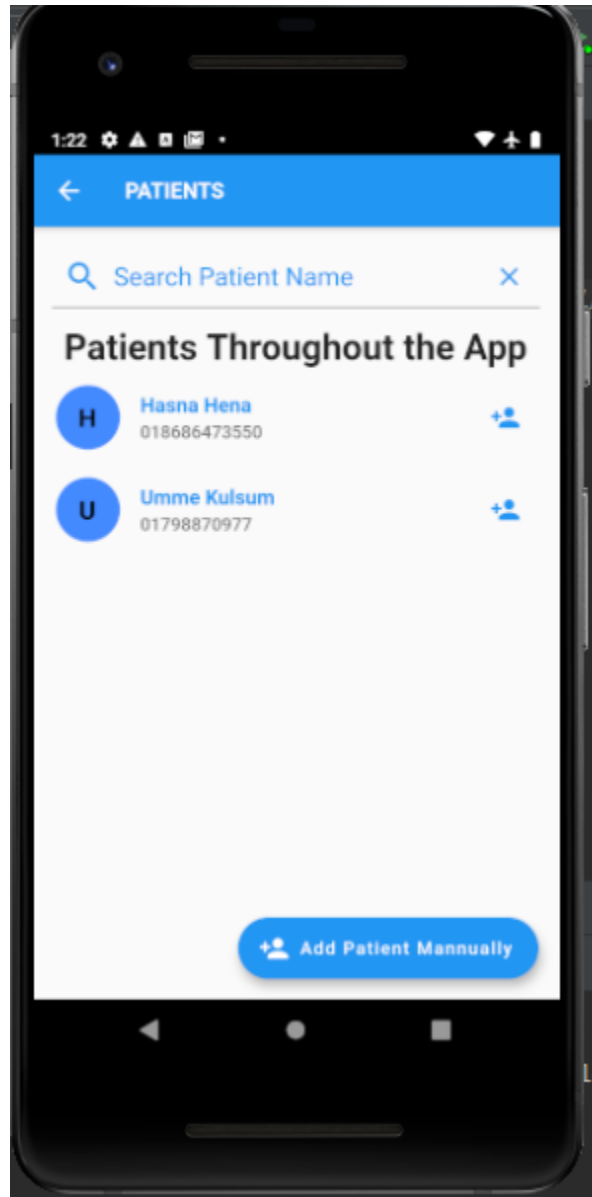


Figure 5.10 : Shows Add Patient Page

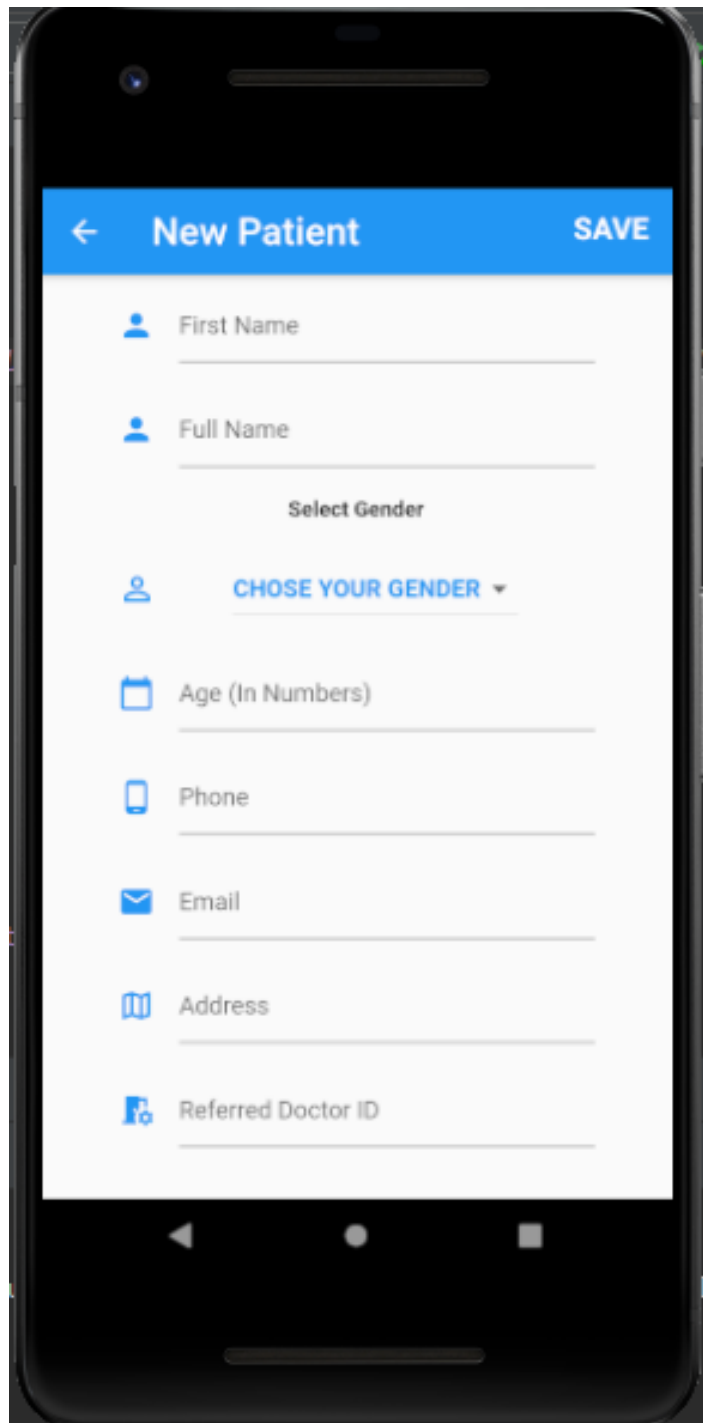


Figure 5.11: Shows Add Patient Manually

Patient page: Doctors can see patient list of his/her and view patient profile and prescription.

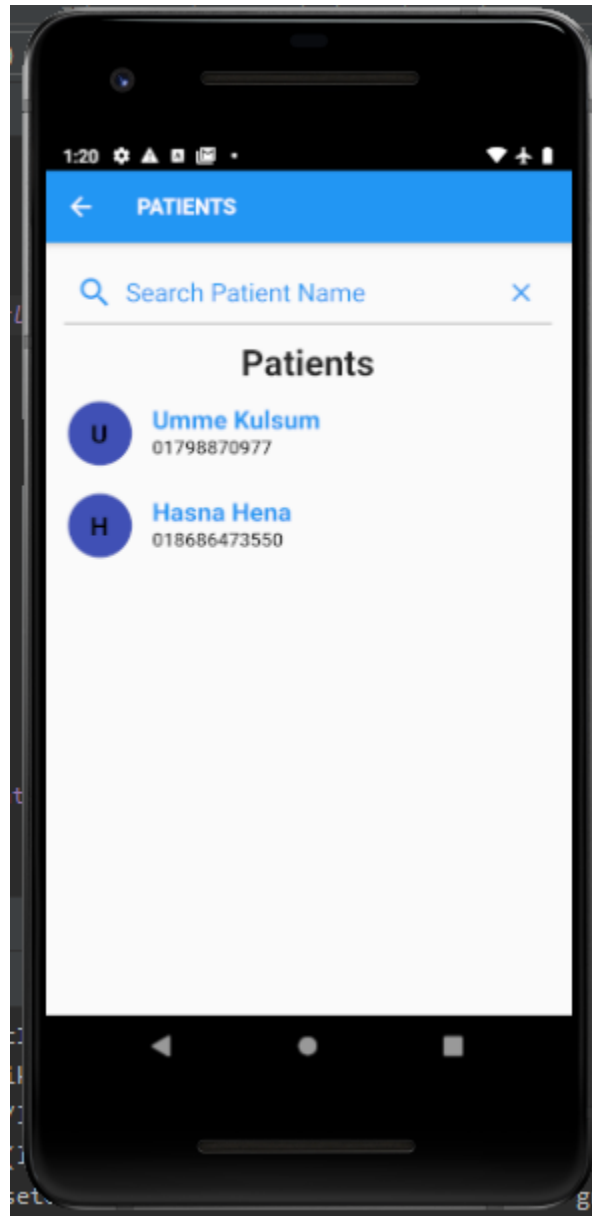


Figure 5.12 : Shows Patient Page

Patient Details page: Doctors can check patient information check patient prescription and delete patient, and also can upload patient prescription

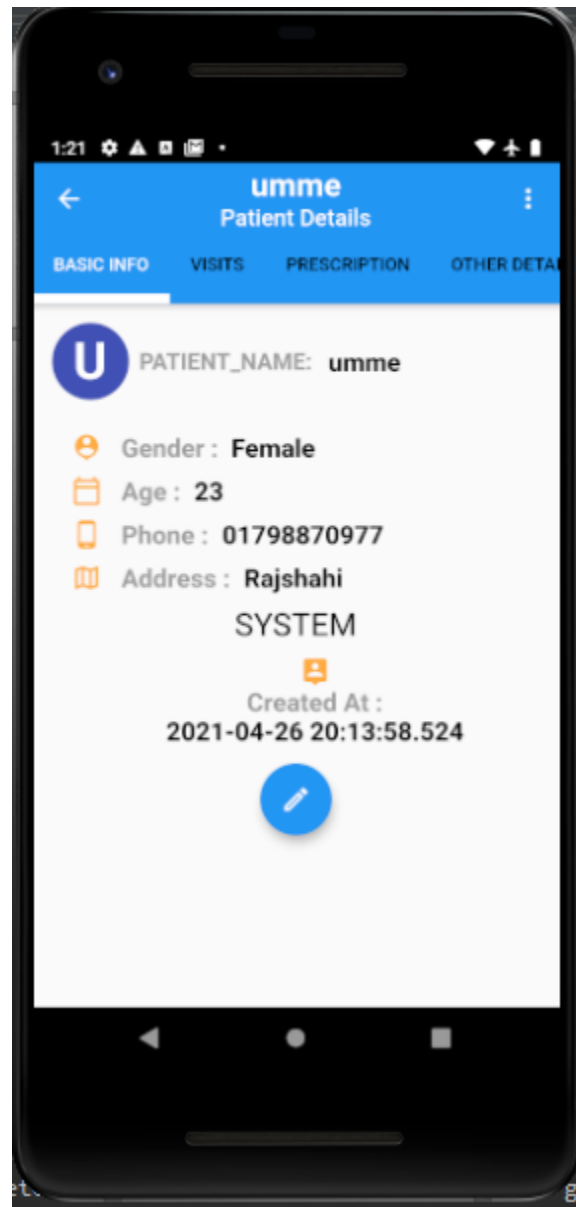


Figure 5.13 : Shows Patient Details page



Figure 5.14.: Shows Patient prescription Tab

Add Assistant Page: In this section doctors can see assigned assistant and also add assistant.

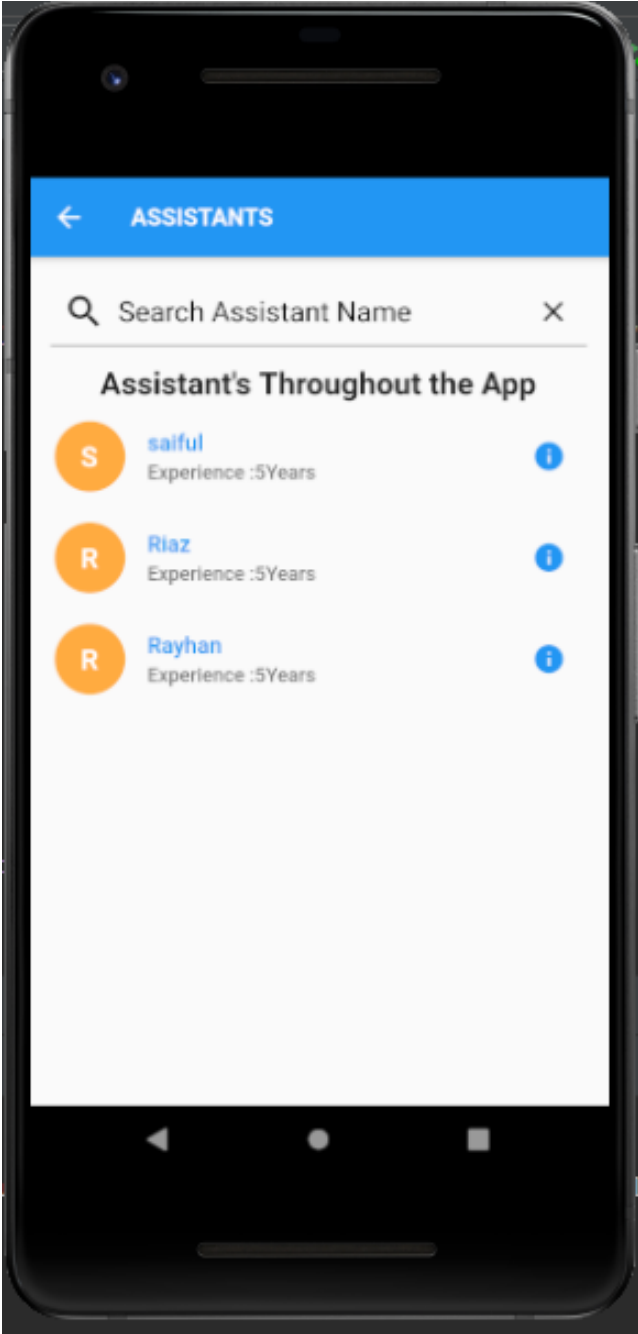


Figure 5.15: Shows Assistants list page

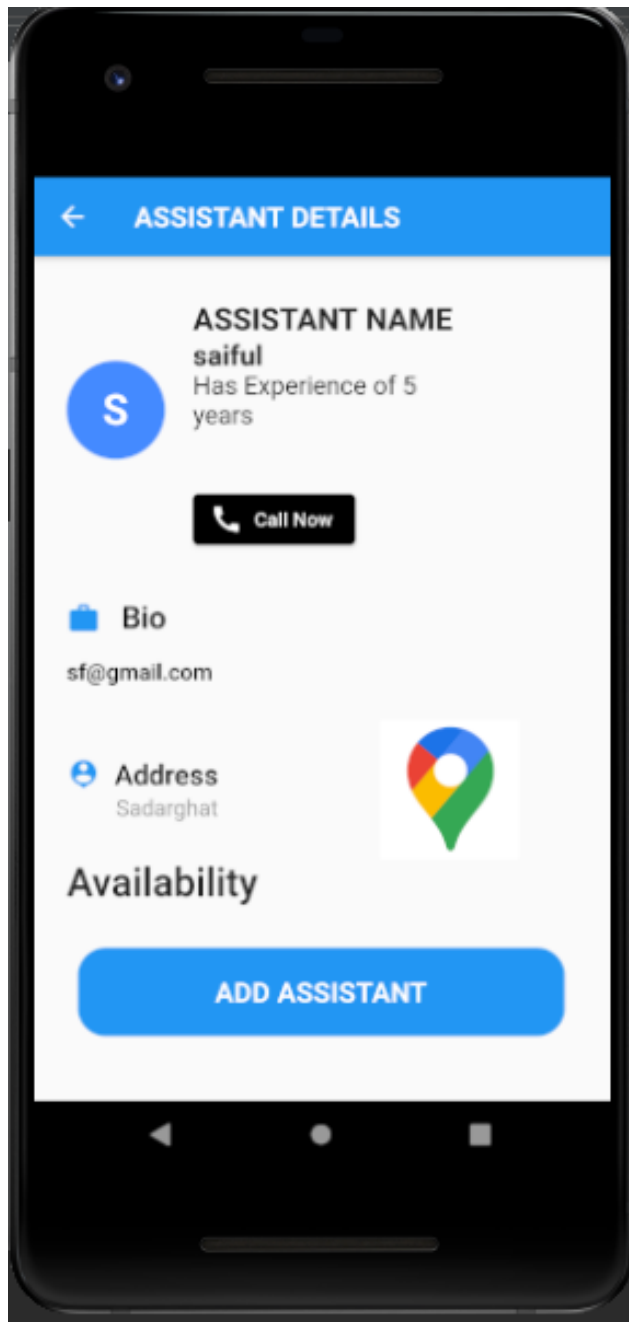


Figure 5.17: Shows Assistants details for add

Assistant Home page: This section refers to assistant homepage where assistant will redirect after successfully log in.

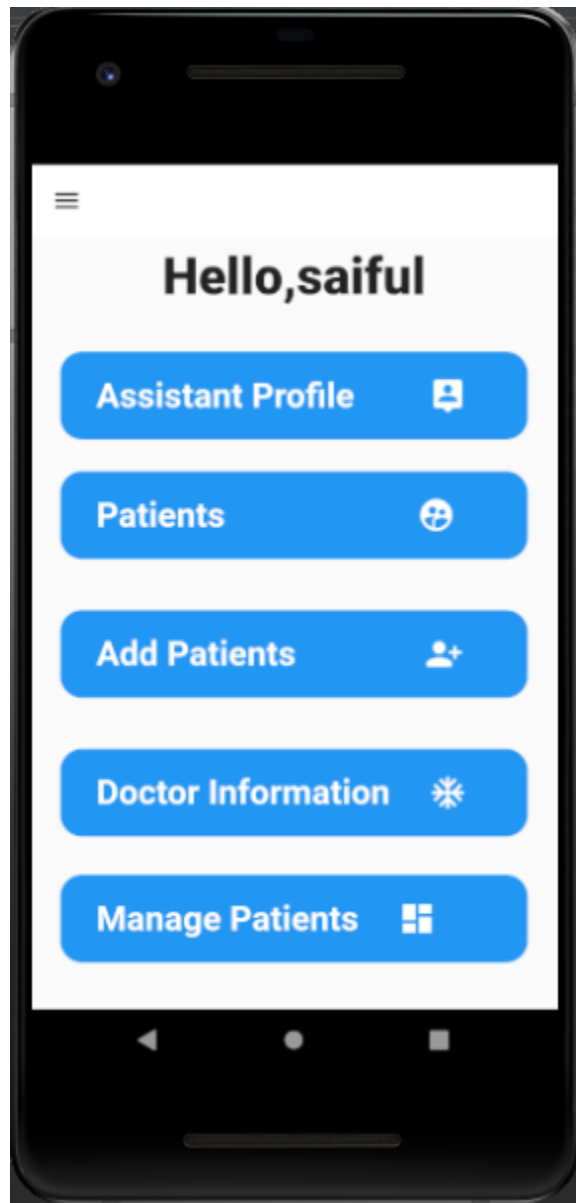


Figure 5.18: Shows Assistants Homepage

Assistant Profile Page: This section represents Assistant profile page .Assistant redirect to this page by clicking assistant Profile. Assistant also edit their bio and Other information through this section.

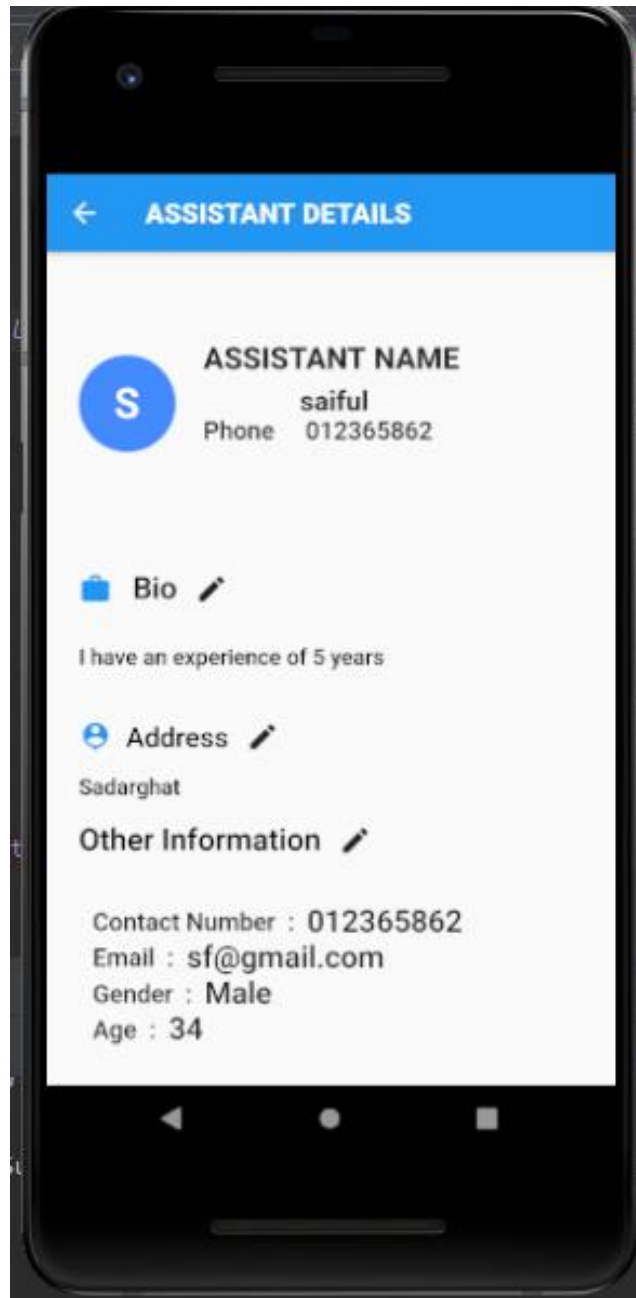


Figure 5.19: Shows Assistants Profile

Patients: Assistant can check patient list under the doctor he is assigned and also check and upload patient prescription if necessary.

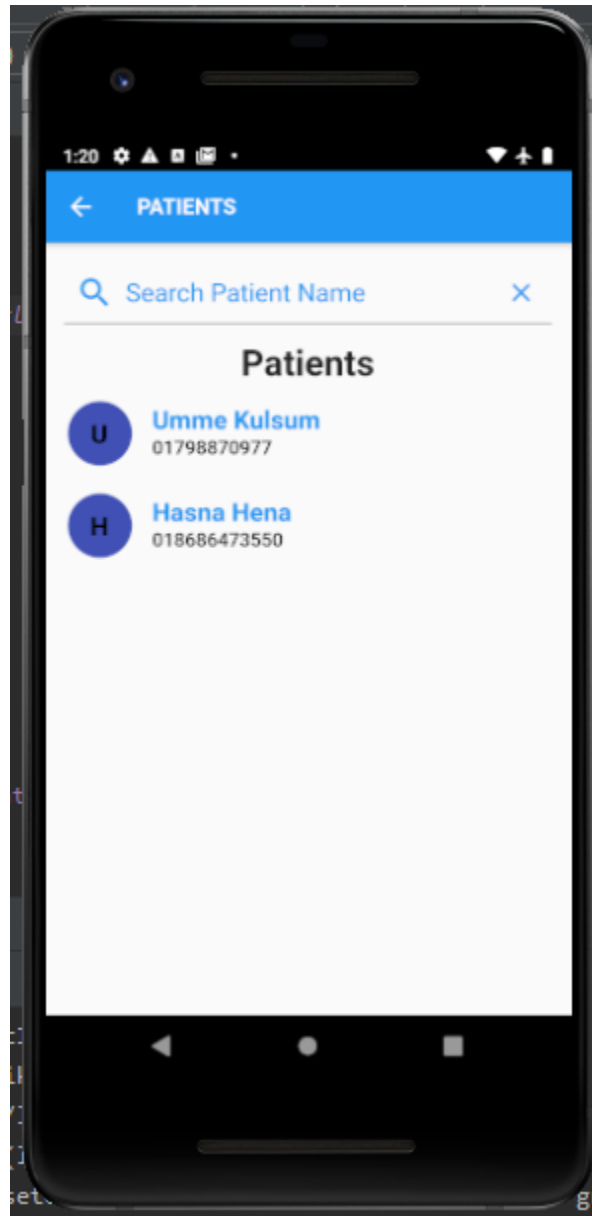


Figure 5.20: Shows Assistants patients

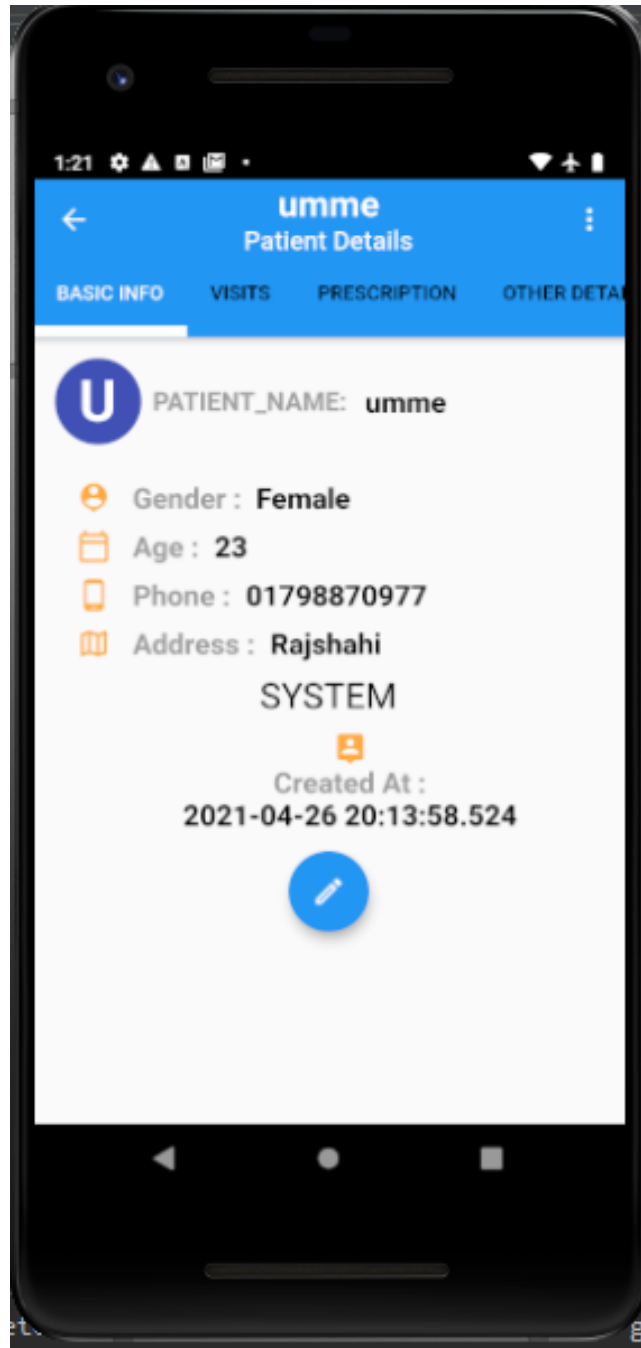


Figure 5.21: Shows Patients details in Assistant UI



Figure 5.22: Shows Upload prescription Assistant

Doctor Information: This section represents the information of doctor to whom the assistant is assigned in.

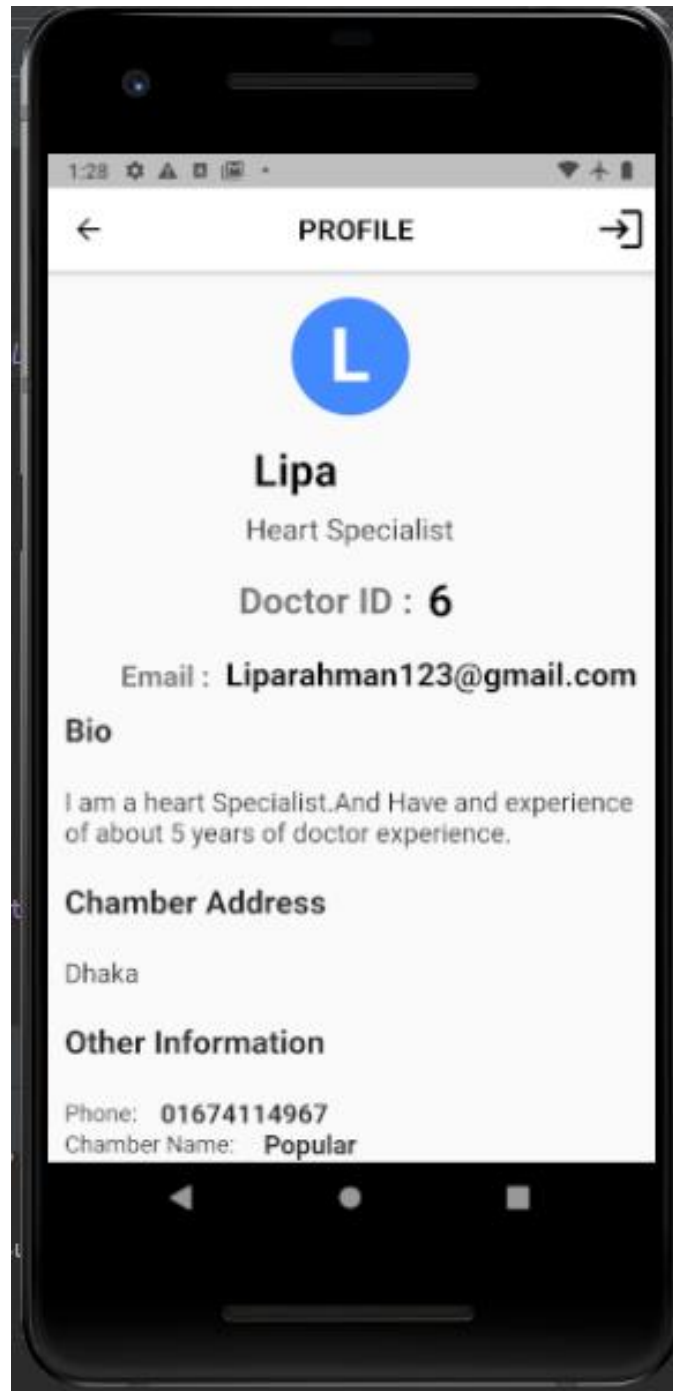


Figure 5.23: Shows Doctors information

Patients Section: This section represents the information of Patients profile and his/her all activities.

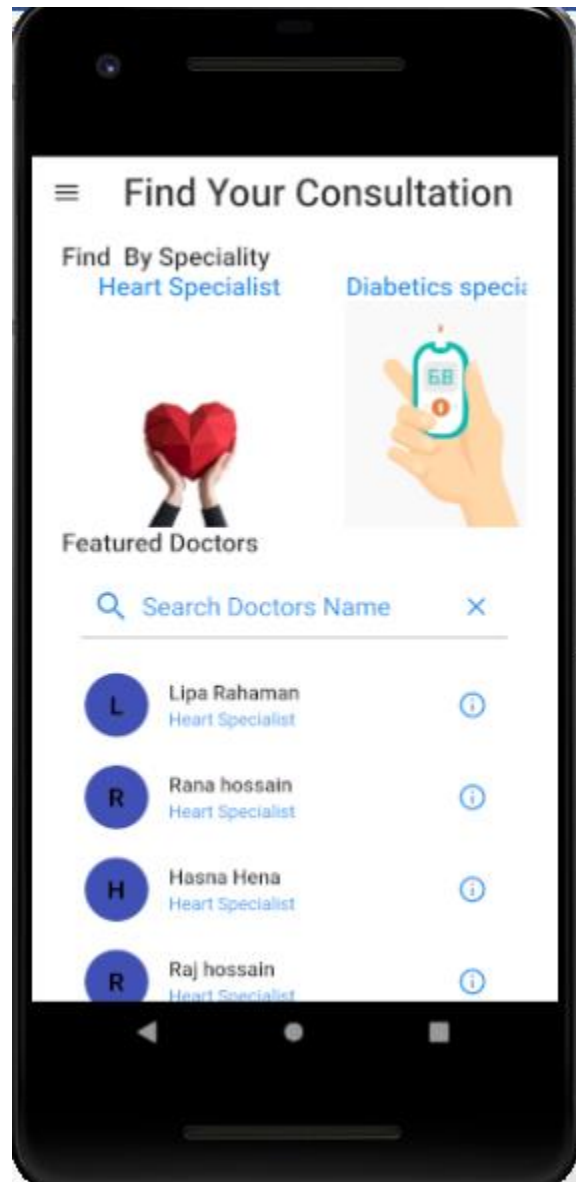


Figure 5.24: Shows Patient Homepage.

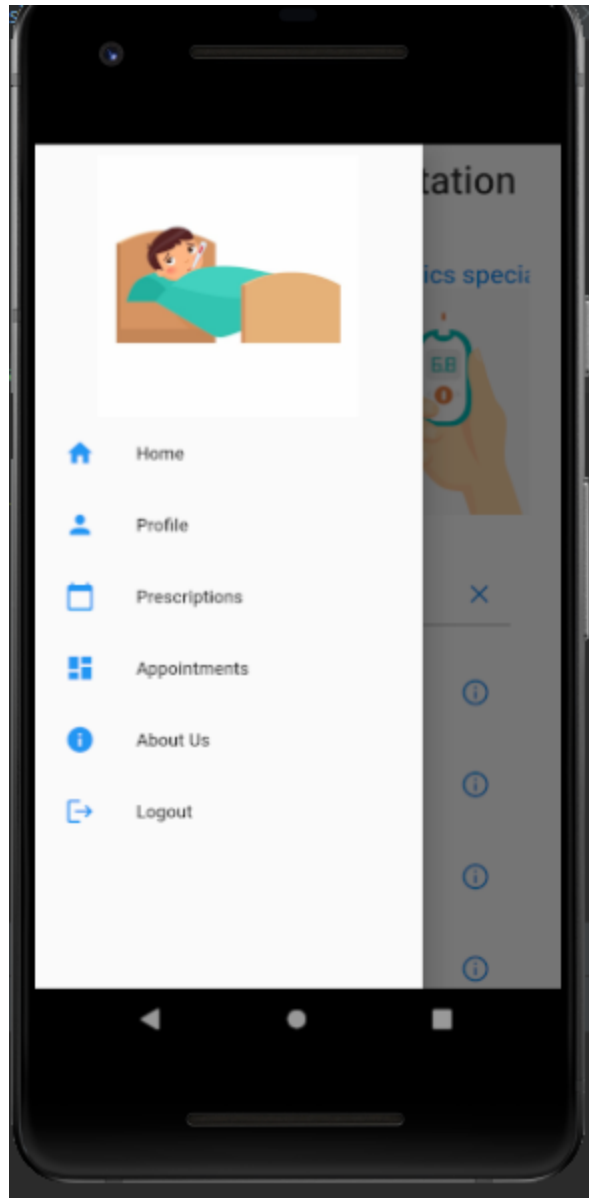


Figure 5.25: Shows Patient navbar-UI.

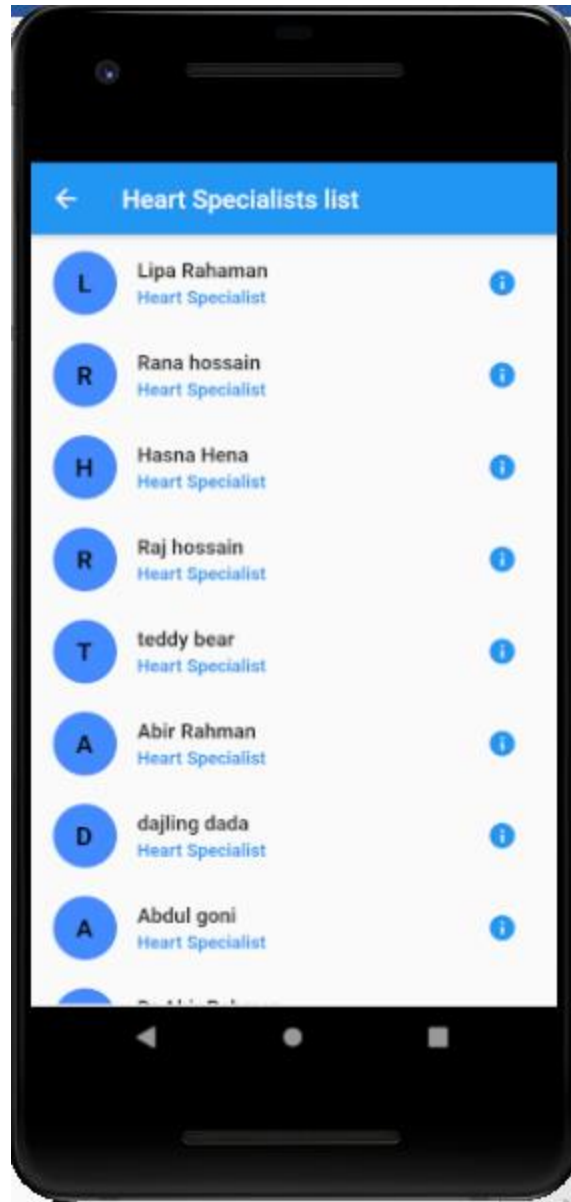


Figure 5.26 : Category-wise doctor list

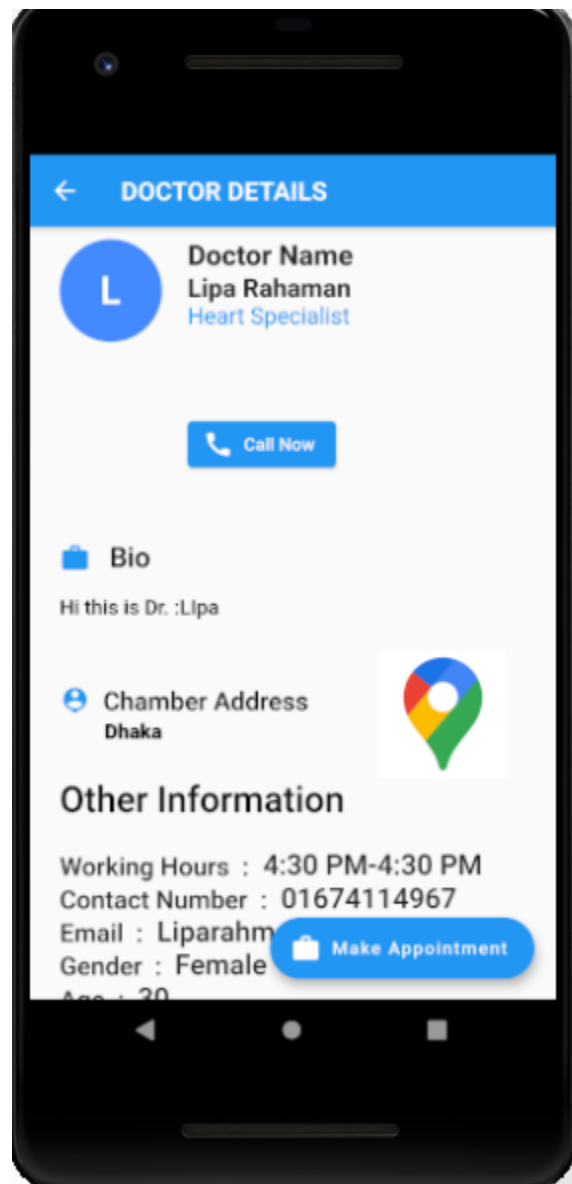


Figure 5.27 : Doctor Details Patient Section.

5.3 Patient management section and UI

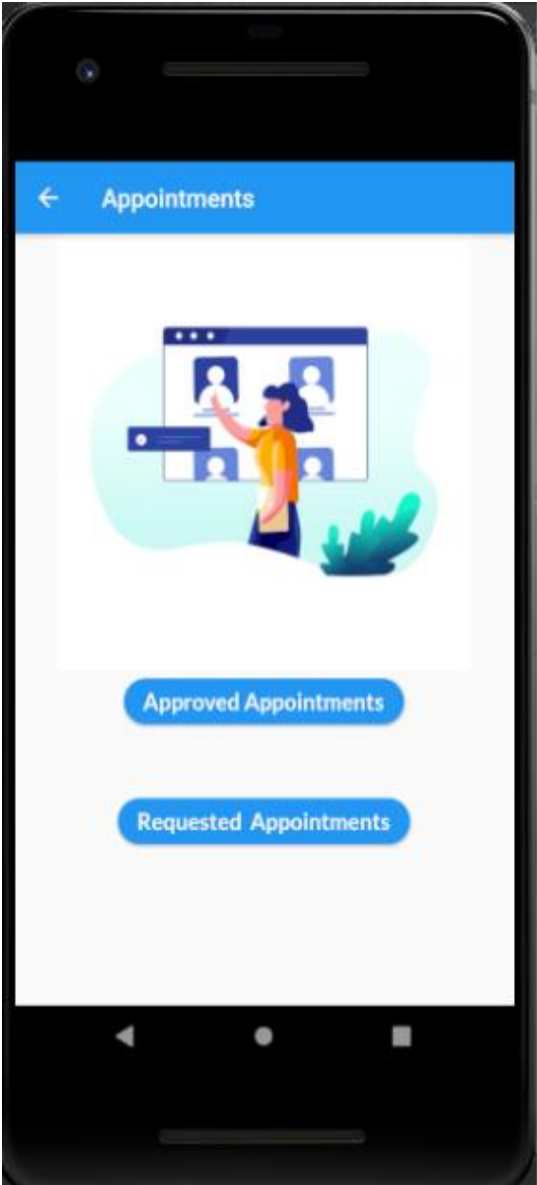


Figure 5.28: Patient Appointment option section

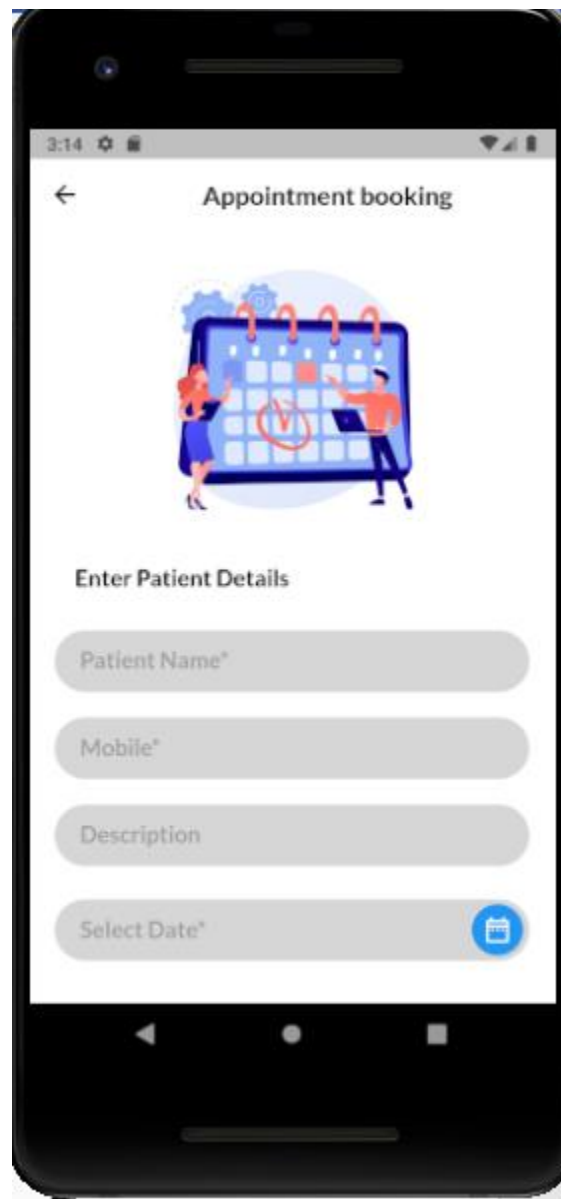


Figure 5.29 : Patient book appointment

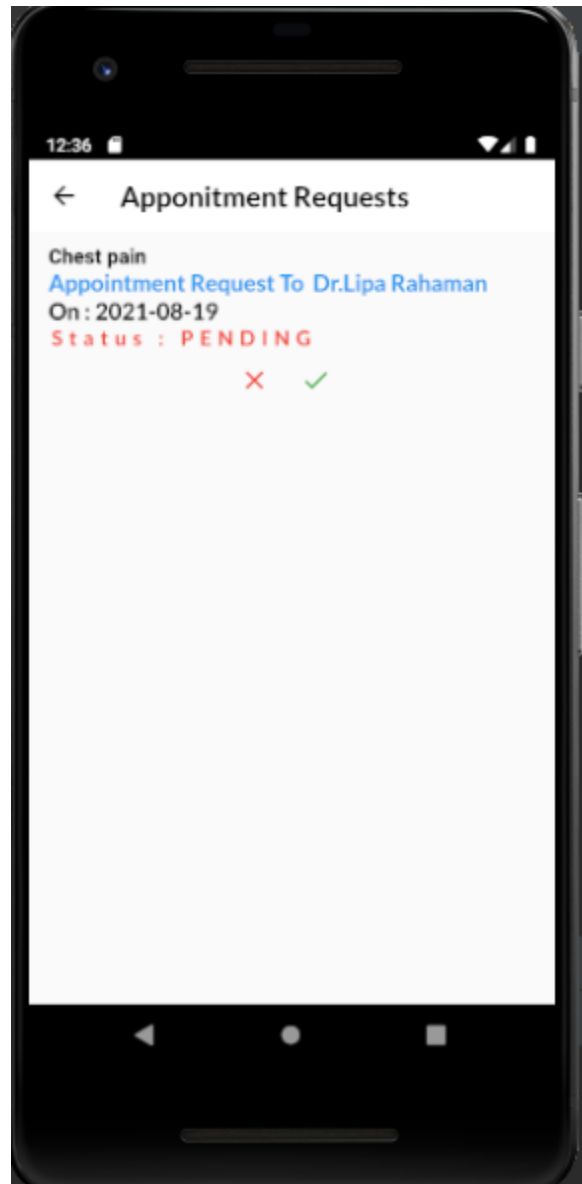


Figure 5.30: Appointment request.

5.3 Patient management section and UI

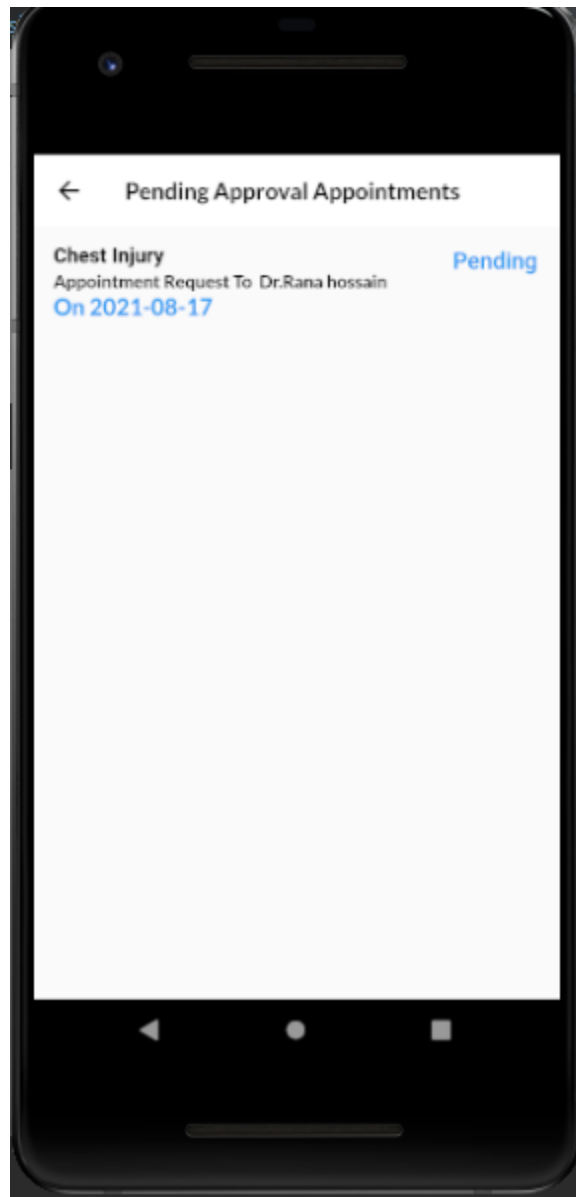


Figure 5.31 : Patient appointment requests.

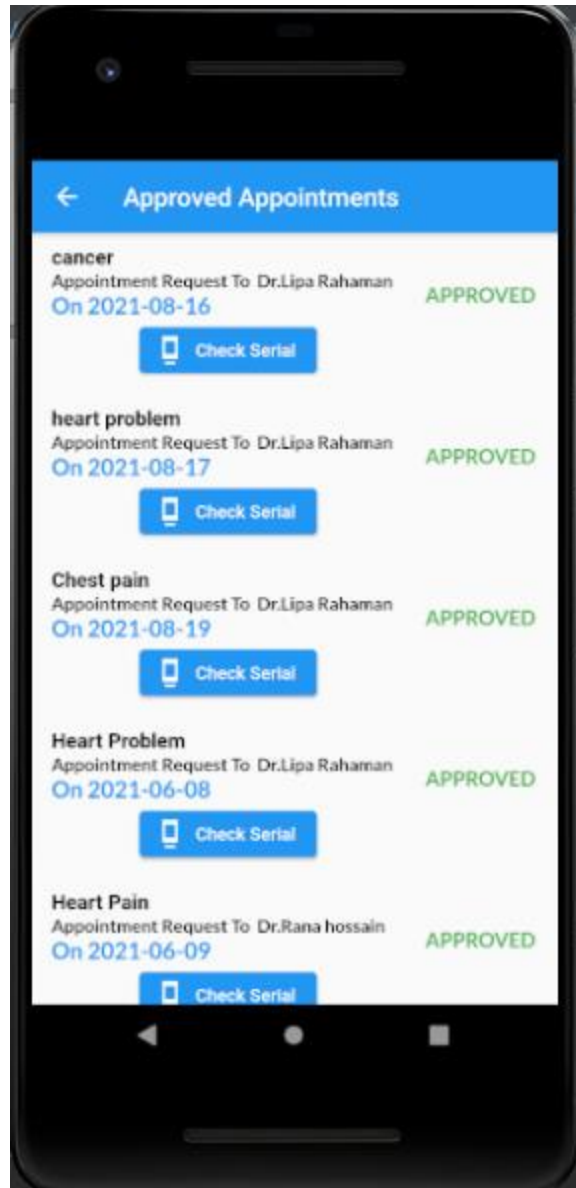


Figure 5.32: Patient approved appointments

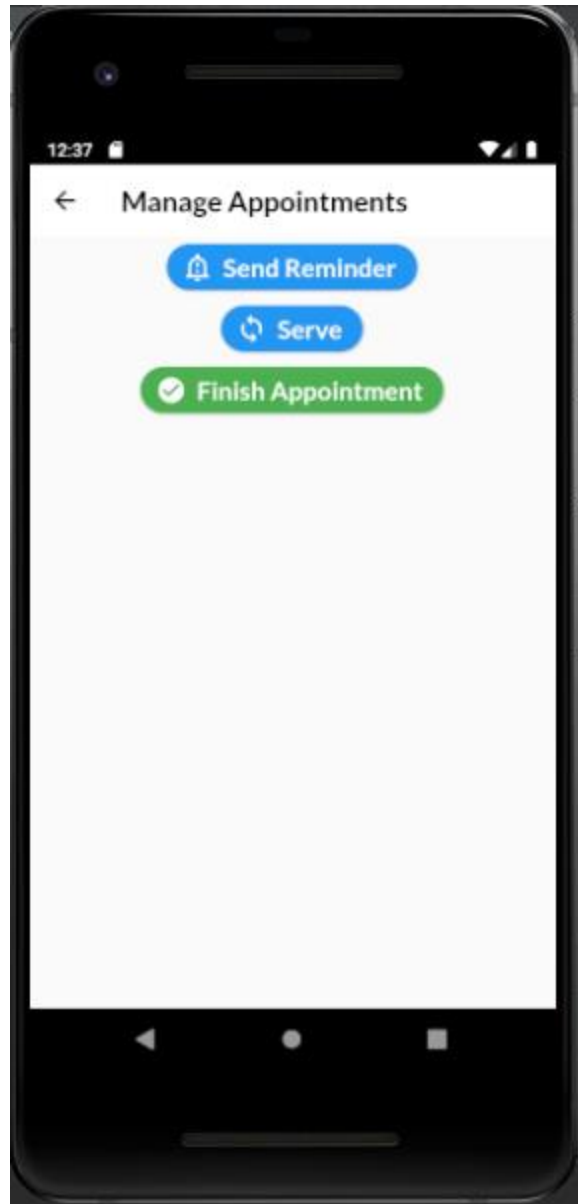


Figure 5.33 : Patient management actions.

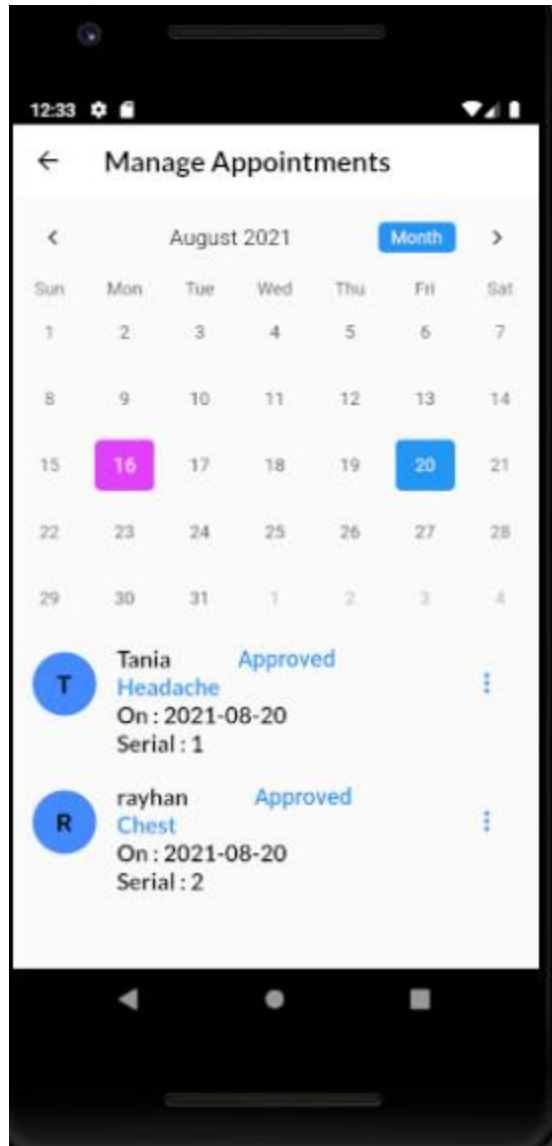


Figure 5.34: Manage appointment.

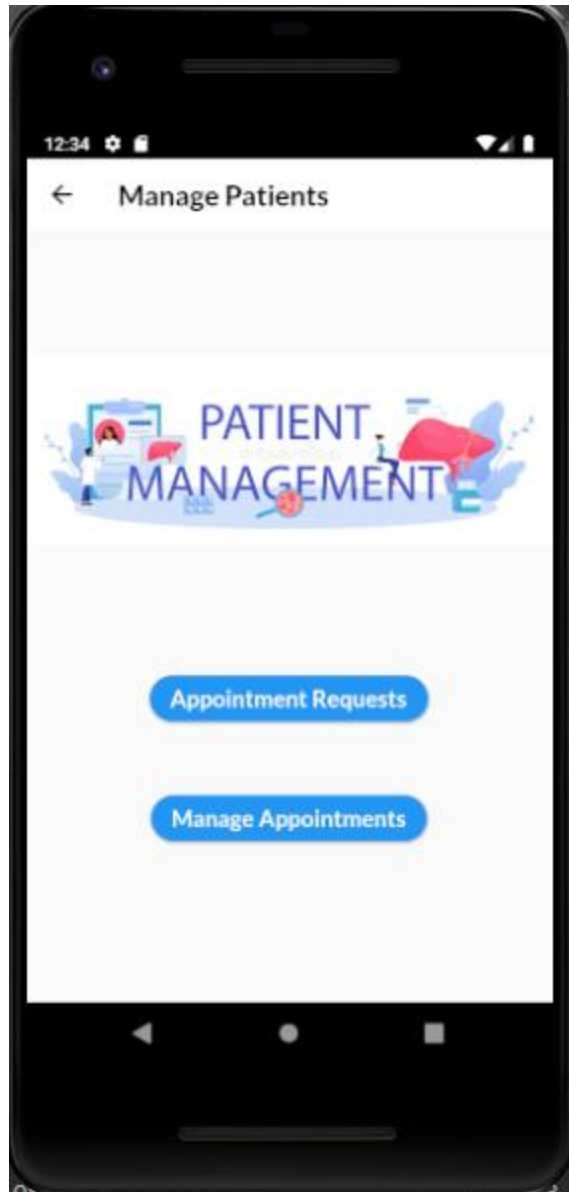


Figure 5.35: Manage appointment option.

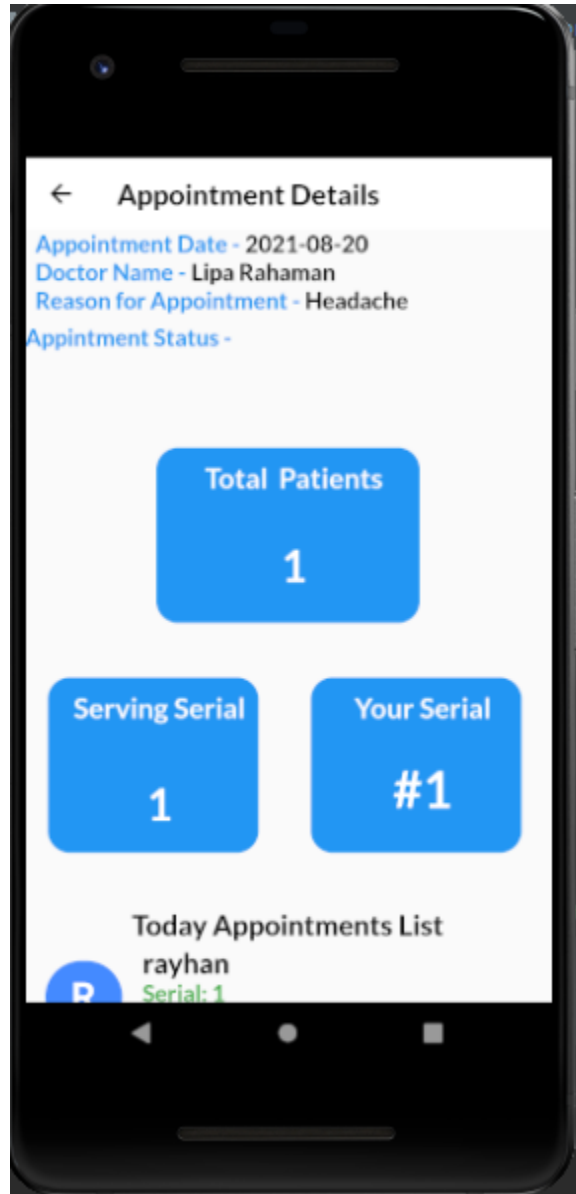


Figure 5.36: Check Serial



Figure 5.37: Prescriptions section.

5.4 Testing Implementation

In this section we perform testing in order to know that we are getting expected outcome or not. We can also determine if there are any defects in this application

Test Case	Test Input	Expected Outcome	Obtained Outcome	Pass/Fail
1. Patient Login	Unique_ID and Password	Successfully login	Successfully login	Pass
2. Patient Login	Incorrect unique ID or password	Login Failed	Login Failed	Pass
3. Doctor Login	Email and Password	Successfully login	Successfully login	Pass
4. Doctor Login	Incorrect Email or Password	Login Failed	Login Failed	Pass
7. Assistant Login	Email and Password	Successfully login	Successfully login	Pass
8. Assistant Login	Incorrect Email or password	Login Failed	Login Failed	Pass
9. View Profile	Click on My Profile tab	View Profile information	View Profile information	Pass
10. Update Profile	Give the data that will need to be updated	Update successful	Update successful	Pass
11. Search Patients	Enter the data that will be searched	Show search result	Show search result	Pass
12. Book Appointment	Work In Progress	Work In Progress	Work In Progress	Work In Progress

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

The present time is the age of technology. The use of technology is increasing day by day. And day by day people are becoming comfortable and lazy, so they are using more and more technology. Everyone wants to do everything effortlessly and easily. And the people of Bangladesh are dependent on the extra time to get medical services. So using technology like smart hospital, smart patient, you can easily get emergency health care like health tips.

6.2 Impact on Environment

Just as technology has a bad effect on the environment, it also has a good effect. This project also has a good impact on the environment. Through this application, doctors will be able to take the serial online and the prescription will be saved here. So you don't have to use paper here. And you don't have to cut down trees for paper. As a result, the balance of the environment will be maintained. Also, since you don't have to stand in line to pick up the serial, there will be less crowds of people which is also good for the environment.

6.3 Ethical Aspects

It is a project that helps people get health care which is one of the basic needs. It also allows you to finish work in less time and without any hassle. And he will be able to do any other important work in the time he survives. So this project is very beneficial for everyone.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

We are now leading our life in an ocean of technologies, the use of technology has to increase a lot. The use of technology has to continue. Everything in modern life has been digitized through the use of technology. Similarly, as the days go by the Android application is becoming popular and its use is also increasing. Now no one can continue without the use of technology. So we are trying to make people's lives easier through this project. And we use our intellect to complete the work of this project and work hard to collect all the data that is needed to add data to the database. So that people can use this project very easily and can benefit. So we have developed this application according to the needs of the world with the future in mind. There was no system in our country where any patient can keep their all medical files, prescription, and history reports. Also, a doctor cannot see a patient's whole previous reports or files easily, and so that most of the time doctors can't check any patient properly because without previous medicine any doctor can suggest any medicines to patients and if they suggest there is a chance of problem of patients in future.

So this system was developed to create an environment between doctor, patient, and pharmacist to take treatment without any hassle from the doctor and buy medicine also. We consider our "Proper Use of Antibiotics & Safe Health" system will be beneficial to both doctors, patients, and pharmacists. Before this system was developed patients can't keep their whole report or prescription files safely.

7.2 Scope for Further Developments

We will try to develop this project further in the future and commercial use. We will add new data and new features so that people can get more benefit by this application and the way of managing patients will be digitized. And we will provide location based services, ambulance services, online news health news feed services to this application for this project for future development.

REFERENCES

[1] IT medicus

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